USGS Response to the Gulf of Mexico Oil Spill, 2010

Sample-Collection Protocols

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8th National Monitoring Conference

U.S. Department of the Interior
U.S. Geological Survey

EXPLOSION: April 20, 2010

- 4.9 million barrels oil
  (185 million gallons)
- Over 1.8 million gallons of dispersant
- Over 540 miles of coastline affected
- 36 National Wildlife Refuges and 8 Nat'l Parks
- About 1/3 of Gulf closed to fishing

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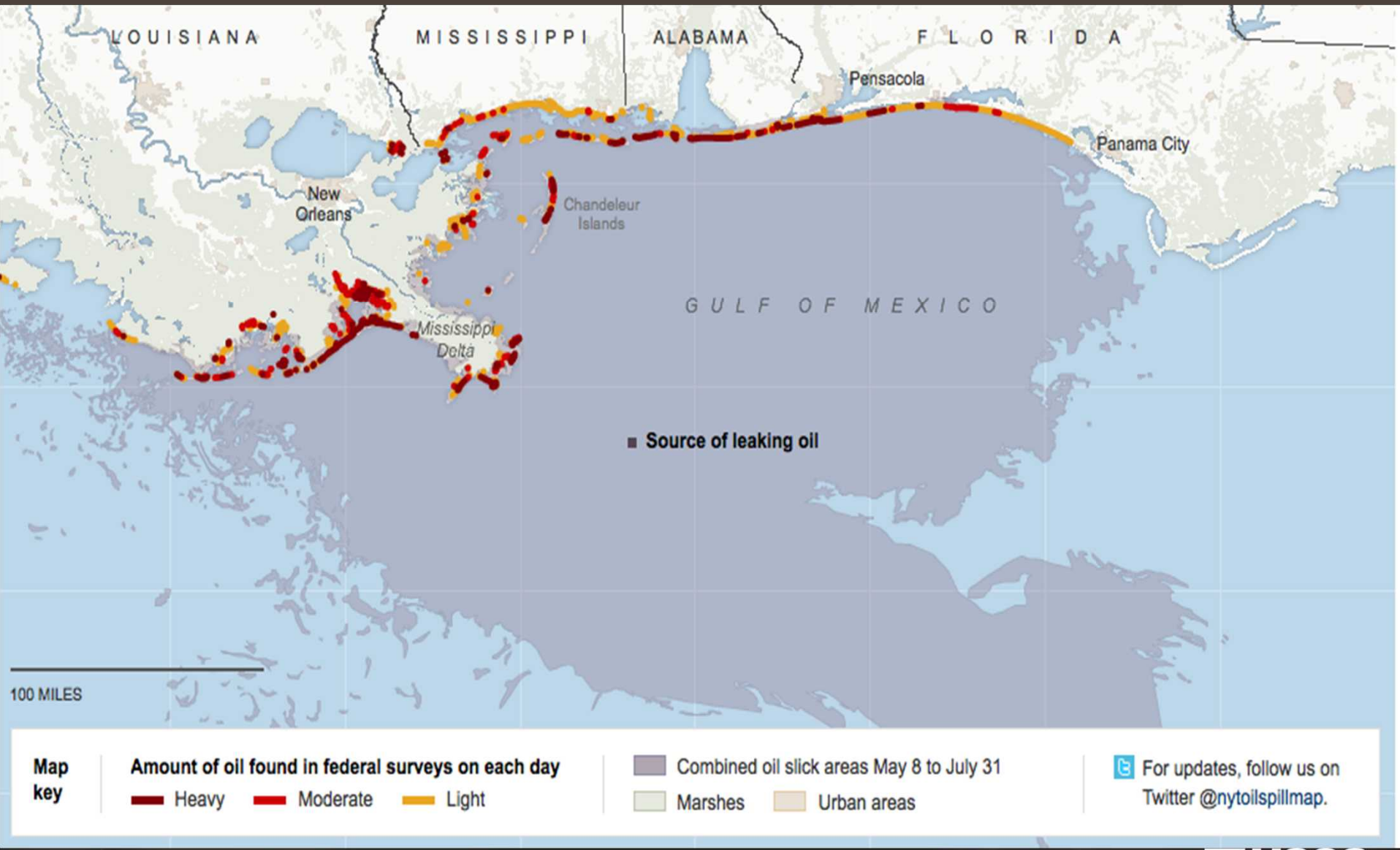
Maximum Oil Extent and Landfall



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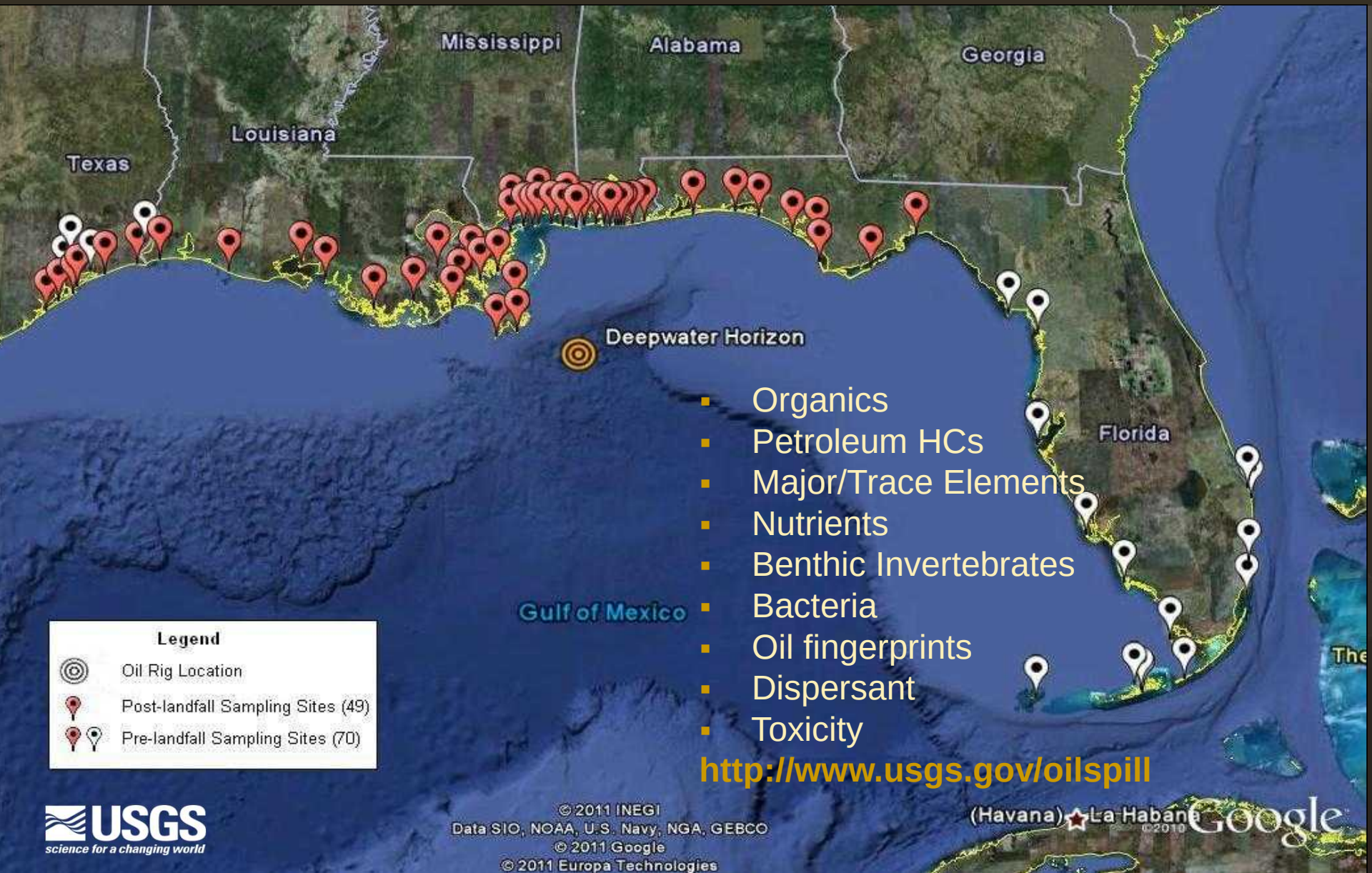
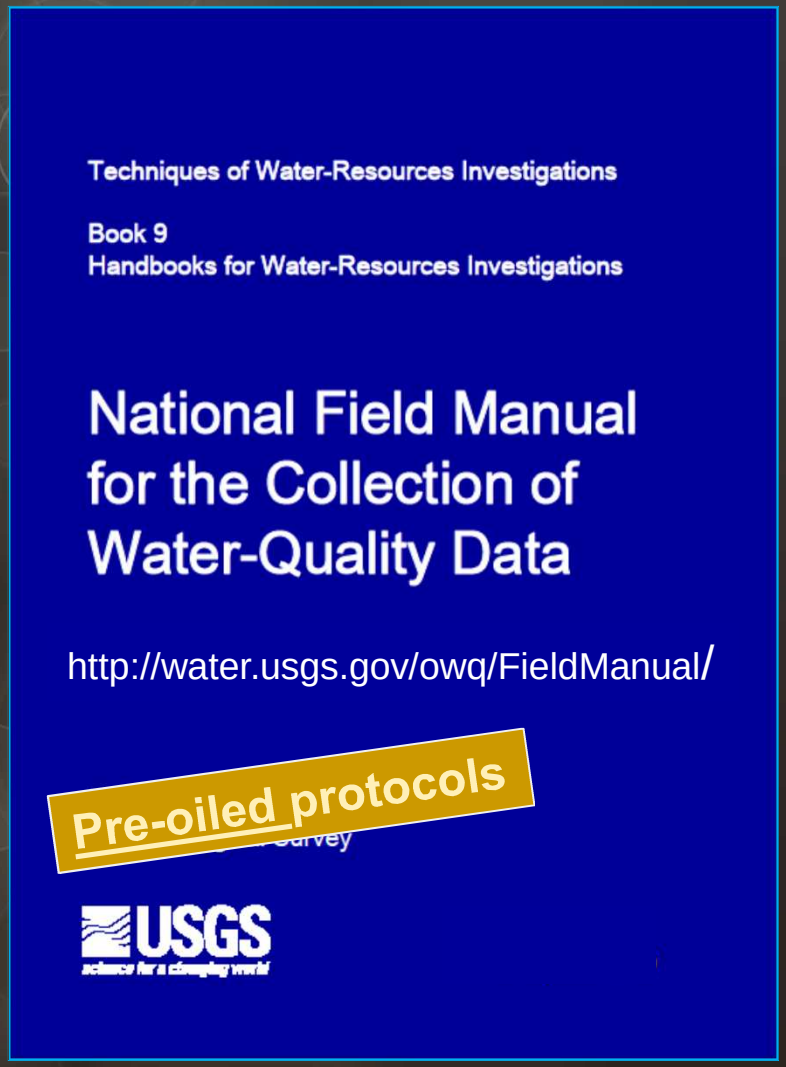
USGS Data Collection at 70 Sites



- Organics
- Petroleum HCs
- Major/Trace Elements
- Nutrients
- Benthic Invertebrates
- Bacteria
- Oil fingerprints
- Dispersant
- Toxicity

http://www.usgs.gov/oilspill

Field Protocols and Procedures



Pre-oiled protocols

U.S. Geological Survey Protocol for Sample Collection in Response to the Deepwater Horizon Oil Spill:

Sampling Methods for Water, Sediment, Benthic Invertebrates, and Microorganisms in Coastal Environments

By F.D. Wilde and S.C. Skrobialowski

Open-File Report 2011-1098
http://pubs.usgs.gov/of/2011/1098/

U.S. Department of the Interior
U.S. Geological Survey

Post-oiled plans & protocols

CHALLENGES

1. *QUICKLY* DEVELOP SAP and PROTOCOLS – Regional sampling for new constituents, in unique field conditions.

2. LEGAL DEFENSIBILITY – Collect regulated samples using strict CoC requirements and documented protocols and procedures. Keep detailed records; archive every e-mail...

3. SCIENTIFIC DEFENSIBILITY – Protocol review. Maintain and document sample integrity and comparability among field teams.

4. COORDINATION – Within USGS and among multiple agencies.

5. SAFETY – Prepare for difficult, hazardous conditions.

6. HIGH PROFILE – Under scrutiny of press, public, and BP/oil industry.

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IMPLEMENTATION

- **Lines of communication: 24/7**
  - **Concalls: OWQ, 5 WSCs, 8 Labs, Safety Personnel**
  - **my.USGS.gov – OWQ_Deep_Oil Wiki**
- **Webinars: Training, Q&A, communiques**
- **Field support:**
  - Simplified, standardized paperwork (ASR, CoC, field forms)
  - Supplies – Equipment list and sources; National Field Supply Services assembled Oil-Spill Kits
  - "App. D" – one table with container, sampling, QC, and shipping requirements, and lab contacts and addresses
  - Uniform database input and data-management guidelines

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Health and Safety Plan

Monitor air quality

Photoionization Detector (PID)

Monitor potential hazards

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HAZARDOUS CONDITIONS

- Current HAZWOPER Certification
- Full-body Tyvek or other PPE.
- Disposable or cleanable PFD, waders, etc.
- Air monitoring – PID, respirator
- HASP and JHA on hand.
- Daily coordination with Unified (or Incident) Command when sampling.

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FIELD DOCUMENTATION

- **All-weather log book**
  - Record site conditions; health/safety issues; heat index
  - Record any deviations from the established protocol or SAP/QAPP.
  - Sign-in log for entry/exit of each team member and visitor to the field site.
- **Legal record of site activities**
- **Field Forms, digital images, etc.**

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Site Layout

Sam

Sa
ass
heav
Onl
equ

Zone (SZ)

wn)

inated
stored.
put on.

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Water Measurements

- Preparation, deployment, and decontamination of multiparameter sonde in oily water.

- Deployment methods:
  - ✓ Plastic Bag
  - ✓ PVC Tube

Winkler used for quality-control of the DO measurement .

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Water Sampling Methods

Site conditions—use best professional judgment.

- **Direct-dip method:** Used when either there was no visible product or slight oily sheen

1

2

3

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Water Sampling Methods

Site conditions—use best professional judgment.

- **PVC-tube method:** Used for visible floating product, prominent oil sheen, and heavy surf conditions.

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Water Sampling Methods
PVC tube and Peristaltic Pump

Deploy the peristaltic-pump tubing

- Insert tubing at top of PVC (no water contact).
- Thread through until intake is at mid-depth of water column.
- Secure tubing to stake/PVC to keep in place

Collect samples

- Sampler 1 collects the samples using peristaltic pump.
- Sampler 2 manages sample containers before and after filling them.
- Sampler 3 assists as needed; brings samples to, shore, completing paperwork, prepares for sediment sampling.

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Sediment Sampling

- **Beach & barrier islands:** Typically, sand cores were collected at the land/water interface (**swash zone**) from the surface to a depth of 9 inches.
- **Wetlands:** Finer sands or muds were collected by teflon scoop at partially or fully submerged areas to a depth of 4 to 6 inches.

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Decon: Contaminant Reduction Zone

Station 1
Dry brush & scrape solids, oil, mud from equipment.

Station 2
Potable water: Detergent wash and water rinse.

Station 3*
HCl solution rinse & DIW rinse. Wastewater into dedicated acid storage container.

Station 4
MeOH rinse. Air dry to complete evaporation. DIW rinse. Contain MeOH and DIW waste solution in labeled, dedicated MeOH waste container.

Station 5
Remove disposable PPE and place into DOT-certified solid-waste receptacle.

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Summary:

The USGS Gulf of Mexico Sampling Protocol describes how to sample oil residues along shorelines and was used by USGS and NOAA mussel watch to sample in response to the Deepwater Horizon oil spill.

- Equipment prep and field use: Collection of blanks, replicate, and matrix-spike QC samples.
- Site set-up at hazardous sites: the EZ, CRZ, SZ, CRZ.
- Decon steps and hazardous materials disposal.
- Health and Safety Plan (HASP) templates and training requirements.
- Deployment of sonde and sampling equipment.
- Workflow diagrams and equipment lists.
- Master spreadsheet template that includes shipping addresses and requirements, and for sample containers, preservation, and handling.
- ASR/CoC and customized field-form templates.
- Wilde and Skrobialowski, 2011 (http://pubs.usgs.gov/of/2011/1098/)

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Questions?

http://water.usgs.gov/owq

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